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Patrick Rawstorne
University of Wollongong

Rohan Jayasuriya
University of Wollongong

Peter Caputi
University of Wollongong

AN INTEGRATIVE MODEL OF INFORMATION SYSTEMS USE IN MANDATORY ENVIRONMENTS

Patrick Rawstorne
Rohan Jayasuriya
Peter Caputi
University of Wollongong
Australia

Abstract

The volitional nature of IS use in organizations is shifting to contexts of mandatory adoption. This has prompted a need for IS researchers to reassess current predictive models of IS use. In this paper we present our work on a theoretical framework for predicting IS use in a mandatory adoption environment. Issues specific to mandatory environments are raised and discussed, and a new model for predicting end-user behavior is proposed. Methodological considerations for testing the model are discussed.

1. BACKGROUND

Over the last two decades, information systems (IS) have become commonplace in work environments. While many organizations believe that the use of IS offers them the potential of a competitive advantage (Yasin and Quigley 1994) there is also a very real concern in organizations that, having invested in IS, the work force may reject the technology, underutilize it, or become more inefficient through decreases in productivity or increases in absenteeism and turnover (Counte et al. 1987). Such problems spawned considerable research into the determinants (personal, social, and organizational) of *user intentions* as predictors of IS use (e.g., Davis, Bagozzi and Warshaw 1989; Adams, Nelson and Todd 1992; Hartwick and Barki 1994; Henry and Stone 1995; Taylor and Todd 1995). The major aims of such research have been (1) to ensure high rates of adoption by enabling system designers, administrators, and those implementing IS, to identify key factors that hinder or assist user acceptance and (2) to develop interventions specifically for the stages of IS design, implementation, and post-implementation.

The models most widely used for predicting *user intentions* and user behavior are derived from the social psychology literature. These models include, the *theory of reasoned action (TRA)* (Ajzen and Fishbein 1980), its derivative, the *technology acceptance model (TAM)* (Davis 1989), the *theory of planned behavior (TPB)* (Ajzen 1985, 1991), and *social cognitive theory (SCT)* (Bandura 1986). Another similar area of research has been based on Rogers' (1983) diffusion of innovations theory.

An underlying assumption in the use of the aforementioned models is that users of IS have a choice about the extent to which they use the technology. Such an assumption has been appropriate in organizations that endorse a policy of voluntary IS use. However, as organizations become increasingly reliant on IS (Henderson and Deane 1996), there is a growing tendency for organizations to mandate that all employees utilize the technology. We contend that there is a need for theoretical development and empirical validation in the specific area of predicting IS usage in mandatory adoption environments.

2. CONTEXTS OF IS ADOPTION

We argue that contexts of IS adoption range between two poles, comprised at one end by *voluntary* adoption and at the other by *mandatory* adoption. Voluntary adoption is present when the *end user* has freedom, without retribution, to decide whether or not to utilize the IS. On the other hand, mandatory adoption occurs when the *end user* is forced by the organization, through reward inducements or threats of punishment or a combination of both, to utilize the IS in a way that replaces at least one previous work practice. A replacement of work practice refers to any occupational function for which use of the IS becomes necessary to fulfil the function. Between the ranges of voluntary and mandatory adoption are various degrees of voluntary or mandatory adoption, depending on how close an individual's adoption environment is to either of the two poles.

3. MEASURING ADOPTION CONTEXT

Some researchers have included a measure of voluntariness in models to predict *user intention* or IS use behavior (see Hartwick and Barki 1994; Karahanna 1997; Moore and Benbasat 1991). In these studies voluntariness was measured as a binary variable by Hartwick and Barki and on a continuum by Moore and Benbasat and by Karahanna. Excluding Karahanna's study, sample constituency in these studies was heterogenous, comprising people from a number of organizations and different occupational roles. Consequently, the Hartwick and Barki variable was evenly distributed while the Moore and Benbasat variable was normally distributed, enabling the measure of voluntariness to be included in a statistical test of the model. The Karahanna sample, on the other hand, was taken from the one organization and the measure of voluntariness seemed to be slightly skewed toward a voluntary adoption environment.

As the shift in organizations toward mandatory adoption contexts continues, a measure of adoption context is likely to be quite skewed, rendering the variable unsuitable for inclusion in models predicting *end-user* behavior. Our contention is that specifically designed models are necessary for measuring *end-user* behavior in a predominantly voluntary or mandatory adoption context. In the current study, we intend to test our assertion by developing a self-report measure of adoption context.

4. VARIANCE IN IS USE IN A MANDATORY ADOPTION ENVIRONMENT

A necessary assumption to predict levels of IS use in a mandatory adoption environment is that there will be variability in individual use. Without this assumption there would be no benefit in deriving a model of prediction. Hartwick and Barki and Moore and Benbasat support this assumption, although in the latter study the assumption was not tested empirically. In any case, in these studies, *end-users* were sampled from different organizations and occupational levels. Hence there were different levels of *voluntariness*, reflecting data not solely from mandatory users.

There is a clear need for data about usage variance to be obtained from a predominantly mandatory adoption environment. In the current study, usage variance will be determined by measuring levels of IS use for a group of hospital nurses identified as *end-users* in a mandatory adoption context.

5. PREDICTING IS USE IN A MANDATORY ADOPTION ENVIRONMENT

Researchers predicting IS use (Hebert 1994; Karahanna 1997; Moore and Benbasat 1991) have typically measured behavioral intentions as a gauge of usage behavior. There is a clear advantage in measuring *user intentions* in addition to a measure of actual IS use. For example, a measure of *user intentions*, taken prior to IS implementation, can provide system administrators with information about possible barriers to acceptance, leading to the development of tailored interventions.

In this paper, however, it is argued that a measure of *user intentions* is inappropriate in a mandatory adoption environment, because the variable would be extremely skewed and unusable in model testing. Another reason for omitting *user intentions*

is the possibility of annoyance to questionnaire respondents. In the current study ,*user intentions* will be measured in a predominantly mandatory adoption context to test our assertion about the unsuitability of such a measure.

An alternative variable to *user intentions* is *symbolic adoption*, a concept recently referred to by Karahanna, who has made use of *symbolic adoption* (Klonglan and Coward 1970) to distinguish adoption in two parts: *symbolic adoption* and *actual adoption*. *Symbolic adoption* refers to the mental acceptance of an idea, distinct from attitude (Karahanna 1997), whereas *actual adoption* refers to actual use of the technology. According to the Klonglan and Coward theory, in a mandatory adoption environment, *actual adoption* need not necessarily be preceded by *symbolic adoption*, while in a voluntary adoption environment, *symbolic adoption* is virtually a prerequisite for *actual adoption* to occur. Hence, in a mandatory environment, people are likely to display differences in *symbolic adoption* of the IS. Identifying such differences is likely to help predict initial resistance or lack of acceptance to technology in a mandatory adoption environment.

Where *symbolic adoption* and *user intentions* differ is in specificity. For example, a measure of *user intentions* typically asks potential *end-users* to rate their intention of using the IS. On the other hand, Karahanna has measured *symbolic adoption* by asking individuals to rate their response to two affective items (about excitement and enthusiasm) in relation to their anticipated use of IS. The construct of *symbolic adoption* in IS clearly needs further conceptual development to determine how it more precisely differs from *user intentions*, attitude, and perceived enjoyment. In the current study, focus groups are being conducted to determine a more precise conceptualization of *symbolic adoption*.

There are clear benefits in deriving a measure of *symbolic adoption*. Innovation dissonance is a term that Karahanna has borrowed from Rogers to refer to a situation in which *symbolic adoption* is at odds with *actual adoption*. For example, in a mandatory adoption environment, a potential *end-user* may have little desire to utilize the IS (low *symbolic adoption*), but is forced to comply, through implicit or explicit rewards or punishment.

According to Festinger (1957), when an individual is forced to comply they are usually placed in a state of cognitive dissonance, which produces an unpleasant feeling brought about by incongruence between one's own beliefs and actions. While innovation dissonance is quite a new concept in the IS literature, it is derived from cognitive dissonance theory (Festinger 1957), of which there is an extensive body of research.

When a person is experiencing dissonance, they are inclined to relieve such discomfort by either changing their behavior or their cognition (Elliot and Devine 1994). In organizations where negative consequences would flow to the employee avoiding the IS, it is more likely that individuals would relieve any dissonance by changing their attitude rather than by avoiding use of the IS.

Dissonance theory predicts that individuals experiencing the most cognitive dissonance have the greatest motivation to alleviate their discomfort by altering their attitude (Elliot and Devine 1994). Because dissonance levels are partly a function of the degree to which the person has been able to express their dissonant feelings (Fleming and Rudman 1993; Pysczynski et al. 1993) and the degree to which forced compliance is perceived (Festinger 1957), managers of IS may be in a position to influence *end-user* dissonance levels in order to facilitate high compliance and use. In the current study, we aim to explore whether innovation dissonance is present by deriving a measure of *symbolic adoption* and identifying those potential *end-users* with a low score on this variable. To validate this method of identifying innovation dissonance, a self-report measure of dissonance (developed by Elliot and Devine 1994) will be administered immediately prior to IS implementation. Furthermore, pre- and post-implementation measures of attitude will be compared to determine whether attitude change has occurred among the dissonant *end-users*.

6. MODEL RATIONALE AND MEASUREMENT

Our hypothesized model of IS acceptance in a mandatory adoption environment is illustrated in Figure 1. The model commences with computer experience because we take the view that influences effecting IS use and acceptance may be sourced back to a person's computer experiences. Studies have shown that general computer experience is associated with positive attitudes of users toward computers (Dambrot et. al. 1985; Igbaria 1990; Robinson-Staveley and Cooper 1990) and *perceived self-efficacy* (Henry and Stone 1995).

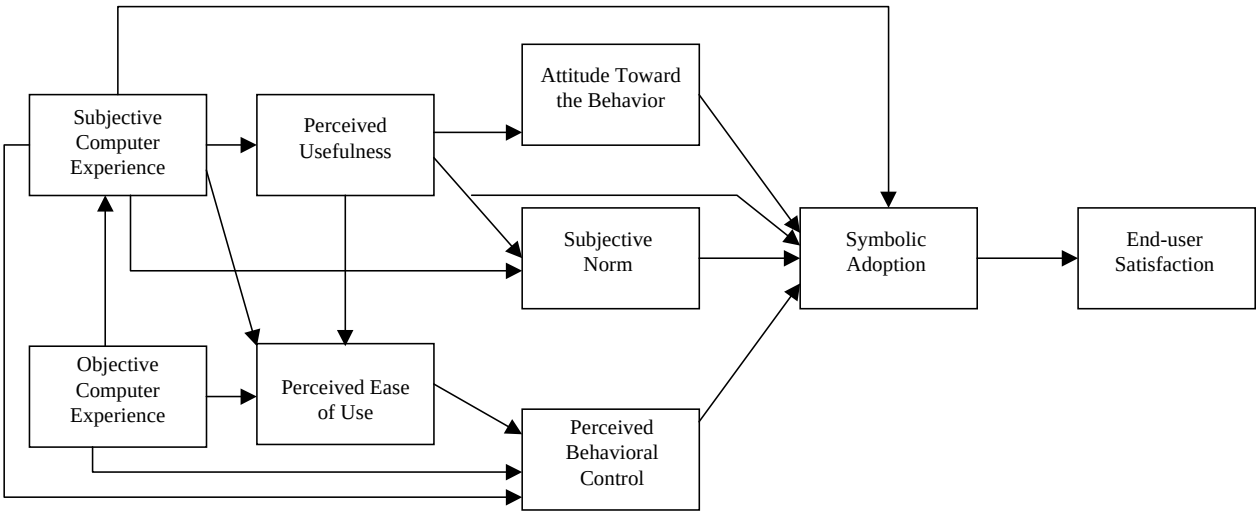

Figure 1. Model of IS Acceptance in Mandatory Adoption Environments

Consistent with emerging views (e.g., Rosen and Maguire 1990; Todman and Monaghan 1994) that a person's past computer experience influences computer attitude formation, we have developed a measure of *subjective computer experience*. The purpose of the scale is to measure a person's interpretation of their computer experience. We also hypothesize that *subjective computer experience* will exert a direct experience upon *symbolic adoption* and will be predicted by *objective computer experience*.

The middle part of the model contains variables that are derived from the TPB and TAM. The arrows between these variables reflect relationships established in the literature. A measure of *perceived behavioral control*, omitted by some studies (Davis, Bagozzi, and Warshaw 1989; Hartwick and Barki 1994) is an important inclusion for predicting behavior which is not under complete volitional control (Ajzen 1985, 1991), such as the use of IT. The inclusion of *subjective norm*, to measure social influences, is considered especially important in a mandatory environment (Hartwick and Barki 1994). *Behavioral intention* is supplanted by *symbolic adoption*, which is predicting *end-user* satisfaction with the IS.

A measure of *end-user* satisfaction (incorporating elements of usage) will be based on the conceptual work of Woodroof and Kasper (1998), who consider IS success as comprising satisfaction in *task support, quality of work life, interface, and decision making* (Garrity and Sanders 1998) across dimensions of process and outcome.

7. RESEARCH SETTING AND METHODOLOGY

Data to test the hypothesized model will be drawn from a state-based computerized clinical information systems project. A computerized patient care information system (PCIS), developed with user involvement, is currently being implemented in one hospital.

A longitudinal design has been employed to enable our hypothesized model to be tested with real-world data. There will be a staggered roll-out of PCIS across a number of hospitals to enable system designers to pilot test the program in one hospital prior to implementation into another. Our data will initially come from the first hospital to receive PCIS, which will serve as a pilot for our model. Subsequent implementation in a number of hospitals will allow the model to be tested with more than 500 participants.

8. CURRENT STATUS OF THE PROJECT

1. Baseline information has been measured for *objective computer experience, subjective computer experience* and the elicitation of *behavioral beliefs, normative beliefs*, and *control beliefs*, using the methods suggested by Ajzen and Fishbein (1980) and Ajzen (1991). More data is currently being collected to measure *perceived usefulness, perceived ease of use, attitude toward the behavior, subjective norms, perceived behavioral control, symbolic adoption*, and *voluntariness*.

2. Focus groups and interviews are about to commence in order to obtain information relevant to conceptual issues about *adoption context* and *symbolic adoption*.

3. Implementation of PCIS is due to occur in the first hospital by the end of October.

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